C – Amendments to the Claims

Claim 15. (currently amended): A method of determining parameters of formations comprising multiple layers and through which a borehole passes, on the basis of a resistivity log recorded in the borehole by means of a measuring and recording tool, the method comprising the steps of:

(i) determining the formation parameters by a quasi-Newton parameter inversion method implemented on pseudo-parameters that are homogeneous and that are determined from the formation parameters taken simultaneously over all the layers of formations, so as to obtain a model of the formations;

(ii) calculating the response of the tool to the model;

(iii) using a comparison criterion for comparing the calculated response with the recorded log;

(iv) performing at least one new iteration if the comparison criterion is not satisfied; and

(v) determining the formation parameters from the calculated response.

Claim 16 (original): A method as claimed in claim 15, further comprising determining boundaries between geological beds prior to implementing the quasi-Newton method.

Claim 17 (original): A method as claimed in claim 16, further comprising determining the bed boundaries on the basis of points of inflection in log data.

Claim 18 (original): A method as claimed in claim 16, further comprising selecting a bed model for each geological bed prior to implementing the quasi-Newton method.

Claim 19 (original): A method as claimed in claim 18, wherein the bed model comprises parameters concerning distance from the borehole axis so as to define radial zones about the axis, and a resistivity parameter within each radial zone defined in this manner.

Claim 20 (original): A method as claimed in claim 15, further comprising selecting observable magnitudes.

Claim 21 (original): A method as claimed in claim 20, wherein selecting the observable magnitudes includes defining a combination of data items from the log.

Claim 22 (original): A method as claimed in claim 18, further comprising selecting observable magnitudes and giving each observable magnitude a value for each geological bed.

Claim 23 (original): A method as claimed in claim 22, wherein the step of giving each observable magnitude a value for each geological bed comprises interpolating, within each layer, values of the observable magnitude as determined within each bed.

Claim 24 (original): A method as claimed in claim 22, wherein each observable magnitude is given a value for each geological bed by giving the observable magnitude the value it possesses at a measurement point closest to the middle of the bed.

Claim 25 (original): A method as claimed in claim 15,wherein the step of determining parameters from log data by a quasi-Newton method is performed by estimating the Jacobian of the problem by Broyden's method.

Claim 26 (original): A method as claimed in claim 15, wherein the log used is an R_{LLs} and R_{LLd} log.

Claim 27 (original): A method as claimed in claim 15, wherein the log used is an R_{LA1}, ..., R_{LA5} log.

Claim 28 (currently amended): A method of determining the parameters R_t, R_{x0}, and d_i of formations comprising multiple layers and through which a borehole passes, on the basis of a resistivity log recorded in the borehole by means of a measuring and recording tool, the method comprising the steps of:

(i) determining the formation parameters by a quasi-Newton parameter inversion method implemented on pseudo-parameters that are homogeneous and that are determined from the formation parameters taken simultaneously over all the layers of formations so as to obtain a model of the formations;

(ii) calculating the response of the tool to the model;

(iii) using a comparison criterion for comparing the calculated response with the recorded log;

(iv) performing at least one new iteration if the comparison criterion is not satisfied; and

(v) determining the parameters R_t, R_{x0}, and d_i from the calculated response.

Claim 29 (original): A method as claimed in claim 28, further comprising determining boundaries between geological beds prior to implementing the quasi-Newton method.

Claim 30 (original): A method as claimed in claim 29, further comprising determining the bed boundaries on the basis of points of inflection in log data.

Claim 31 (original): A method as claimed in claim 29, further comprising selecting a bed model for each geological bed prior to implementing the quasi-Newton method.

Claim 32 (original): A method as claimed in claim 31, wherein the bed model comprises parameters concerning distance from the borehole axis so as to define radial zones about the axis, and a resistivity parameter within each radial zone defined in this manner.

Claim 33 (original): A method as claimed in claim 28, further comprising selecting observable magnitudes.

Claim 34 (original): A method as claimed in claim 33, wherein selecting the observable magnitudes includes defining a combination of data items from the log.

Claim 35 (original): A method as claimed in claim 31, further comprising selecting observable magnitudes and giving each observable magnitude a value for each geological bed.

Claim 36 (original): A method as claimed in claim 35, wherein the step of giving each observable magnitude a value for each geological bed comprises interpolating, within each layer, values of the observable magnitude as determined within each bed.

Claim 37 (original): A method as claimed in claim 35, wherein each observable magnitude is given a value for each geological bed by giving the observable magnitude the value it possesses at a measurement point closest to the middle of the bed.

Claim 38 (original): A method as claimed in claim 28,wherein the step of determining parameters from log data by a quasi-Newton method is performed by estimating the Jacobian of the problem by Broyden's method.

Claim 39 (original): A method as claimed in claim 28, wherein the log used is an R_{LLs} and R_{LLd} log.

Claim 40 (original): A method as claimed in claim 28, wherein the log used is an R_{LA1}, ..., R_{LA5} log.